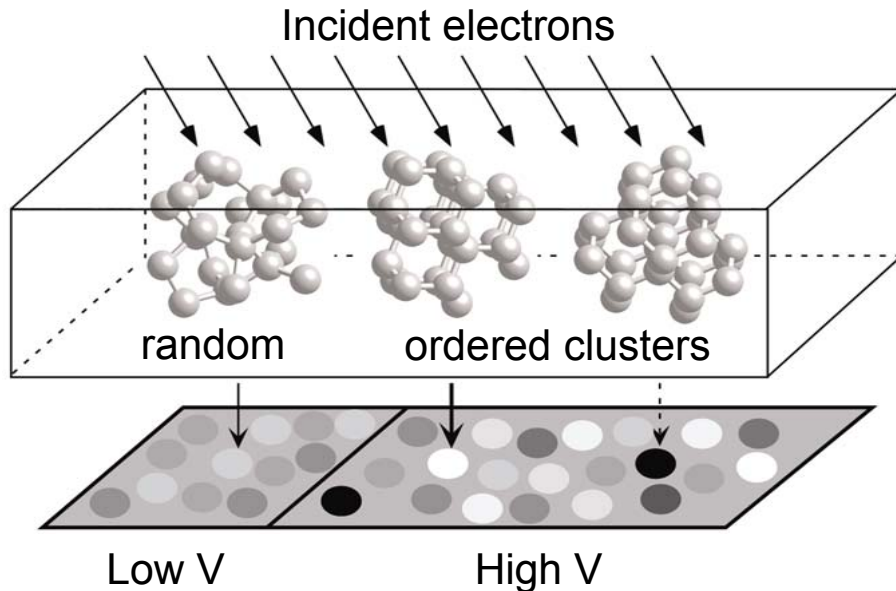
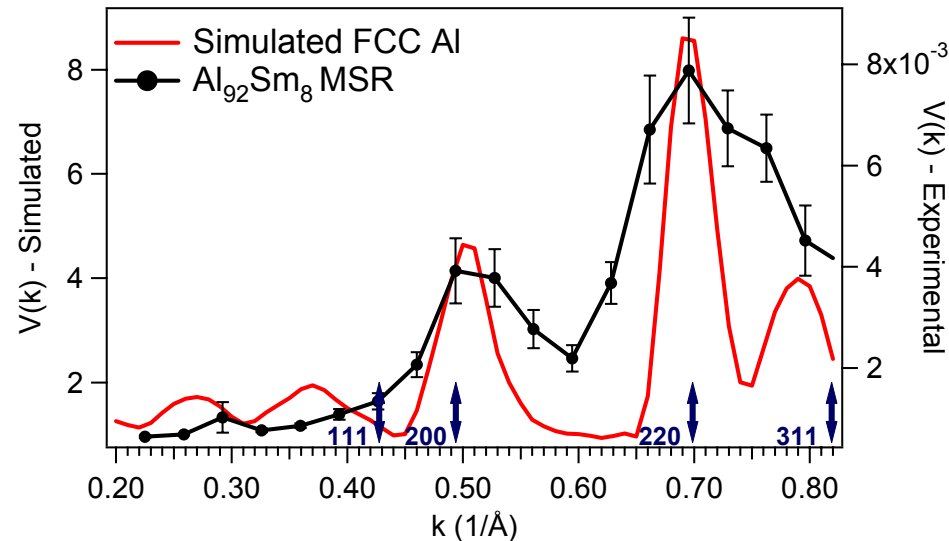


Nanoscale Order in Metallic Glass

Paul M. Voyles, University of Wisconsin, DMR-0347746



- Fluctuation electron microscopy: study nanoscale spatial fluctuations in diffraction, quantified by variance as a function of scattering vector $V(k)$.
 - $V(k)$ peak magnitude depends on ordered region length scale and density
 - $V(k)$ peak position depends on ordered region internal atomic structure.



- Melt-spun $\text{Al}_{92}\text{Sm}_8$ metallic glass shows primary Al crystallization of <10 nm crystals at densities $>10^{20} \text{ m}^{-3}$.
- Experiments show evidence of local fcc-Al crystallinity in as-spun ribbon:
 - 0.5-2 nm characteristic size
 - reduced by annealing $<T_g$
 - not present in $\text{Al}_{92}\text{Sm}_8$ amorphized by deformation
 - *may catalyze primary nanocrystallization*

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- Worked with Pamela Tuchscherer, a middle school teacher for 5-week summer RET program with UW MRSEC on Nanostructure Materials.
- Pam developed an inquiry-based instructional module for middle school students exploring the atomic structure of metals via efficient packing of hard spheres.
- Experiments lead students to discover cubic and hexagonal crystal structures in 2D and test packing efficiency of disordered structures.



- Organized symposium *Order in Disorder: Probing the Structure of Amorphous Materials* at Microscopy and Microanalysis 2004 with J. Mansfield, U. Michigan.
- 22 presentations, >40 attendees from US, Europe, Japan, and Australia
- Themes: applications of fluctuation electron microscopy and EELS, complementary scattering techniques